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AUTHOR Yuen, Steve Chi-Yin; Duo, Jeong-Fong
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ABSTRACT

Developing a management information system (MIS) is one approach to meeting the information collection, storage, manipulation, and usage needs of cooperative education. Within cooperative education, MIS can help in the areas of accountability, program planning, decision making, management of cooperative education activities, and program evaluation. The following steps are involved in the process of developing an MIS for cooperative education: (1) determining program goals and objectives; (2) identifying information and data needs; (3) building the database by determining data collection and procedures and by determining the methods for storage and manipulation of information; and (4) reporting and using the information. There are a number of commercially available computer software packages that serve very well as the basis for a locally developed MIS, even though they were not originally developed for that purpose. Among them are The Placement Assistant, Easytrieve, Report Generator, Statistical Analysis Systems, dBase, Reflex, Minitab, and Statistical Package for the Social Sciences. Program information needs should determine what hardware and software is purchased. The computer system selected should allow management, information processing, and educational applications. Ideally, the computer component should be compatible with any mainframe computer in use in the school so that information already available in the student database can be shared between them. (The document contains an 18-item bibliography.) (CML)

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Developing a Management Information System for Cooperative Education

by

Steve Chi-Yin Yuen, Ph.D.

The University of Southern Mississippi

Business and Industrial Education

Hattiesburg, Mississippi

and

Jeong-Feong Duo, Ph.D.

National Chung Hsing University

College of Law and Commerce

Taiwan, Republic of China

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Developing a Management Information System for Cooperative Education

In the past two decades, cooperative education has grown rapidly. Student enrollment, program offerings, instructional personnel, finance, facilities and equipment have dramatically increased during this period. This has produced a rapid increase in the amount of information and data required for planning, reporting, evaluation, and decision-making relating to cooperative education.

Cooperative education is an educational strategy that has unique information collection, storage, manipulation, and utilization needs. For instance, co-op coordinators are responsible for collection of information on employers and students; matching students with work experiences; monitoring the progress of students during their work experiences; evaluating the results of each student-employer match; and making detailed progress reports to administrators and, in many cases, state and local governments. All these require information collection, storage, manipulation, and utilization (Varty and Thompson, 1980). Development of a Management Information System (MIS) is one approach used to meet these needs.

Definitions of MIS

The MIS concept is relatively recent, originating in the field of business management after World War II. It is now being applied to decision-making in educational settings. Definitions of MIS are numerous and often vague. However, the following definitions should provide a conceptual framework of MIS:

> . . . is an organized method of providing past, present and projection information related to internal operations and external intelligence (Kennevan, 1970, p.63).

> . . . is to provide management with a real-time mode of information processing which supports decision-making (Ritch and Munro, 1980, p. 4).

> . . . provides management with the information it requires to monitor progress, measure performance, detect trends, evaluate alternatives, make decisions, and to make corrective action (Duersch, 1968, p. 2).
>
> . . . is an integrated, man/machine system for providing information to support planning, management, and operating functions in an organization (Portny, 1982, p. 17).
>
> . . is a computer-based network containing one or more operating systems. It provides relevant data to management for decision-making purposes and also contains the necessary mechanism for implementing changes or responses made by management in the decision-making activity (Prince, 1970, p. 40).
>
> . . . is a communication process in which information (input) is recorded, stored and retrieved (processed) for decision (output) on planning, operating, and controlling (Murdick and Ross, 1971, p. 292).
>
> . . . is the combination of human and computer-based resources that results in the collection, storage, retrieval, communication and use of data for the purpose of efficient management of operations and for business planning (Kelly, 1970, p. 5)

The quoted definitions emphasize that an MIS (1) applies to all management levels; (2) has and is linked to an organizational subsystem; (3) functions to measure performance, monitor progress, evaluate alternatives, or provide knowledge for change or corrective action; and (4) is flexible, both internally and externally (Coleman and Riley, 1973).

However, MIS can be conceived as an organized method for data capture, recording, storage, update, retrieval, analysis, and output. In this process, data is consistently collected, condensed, and filtered until it becomes information. This information is used for accountability documentation and improving planning and decision making (Geigle, 1978). MIS can provide accurate, reliable, and timely output that assists co-op coordinators and/or administrators in improving their planning and supporting decision-making.

Purpose of MIS

All MIS are organized approaches to collecting, processing, and utilizing information in order to determine if the objectives of an organization have been achieved, and assist in decision making. Therefore, the purpose of MIS is to furnish the necessary information to the right person, at the right time, for use in management decision.

An MIS is the total complex in which data are generated, processed, and refined to produce the information needed at all facets of an organization. To accomplished those goals, objectives must be established; information needed to evaluate performance must be determined; an effective system must be developed, installed, and maintained; the system's adequacy as a basis of information for management decisions must be reviewed and appraised continually. Thus, the purpose of an MIS is to provide, as efficiently, effectively, and economically as possible, what management needs to know. It should provide information essential for goal achievement, for preventing failures, and for correcting conditions (Riley, 1980).

The Need of MIS in Cooperative Education

In the past decade significant advances have taken place in the development of MIS to support managerial decision making. However, recent literature has shown that educators have made full and efficient use of MIS. The following areas point out the value of applying the MIS concept to cooperative education.

Accountability

In the past two decades, concern over accountability has been focused on vocational education and its ability to provide people with the necessary skills, knowledge and attitudes for successful employment. As with every other education program for which tax dollars are being spent, vocational education is being held

accountable for its mission and expenditures (Geigle, 1978; Patterson, Stallings, and Simms, 1977). If co-op education is to command the support it needs in vocational education and in schools, it will have to demonstrate its case clearly and objectively. Justification of budget requests, therefore, will have to document not only the growing numbers of students being served but, most importantly, the increased quality and effectiveness of co-op programs.

Demonstration of educational accountability implies good record keeping and the systematic collection of data or information. Information is required to prove accountability as well as to improve planning and decision making within cooperative education. With functional MIS, states and local school districts should be able to demonstrate more easily what is happening in vocational education and cooperative education. Also, they should be able to communicate to taxpayers the necessity for current co-op programs and the manner in which tax dollars are being allocated.

Program Planning and Decision Making

McCraken (1973) found that nearly 90 percent of the problems faced by the state vocational director required information for their resolution and that available information often failed to reach key decision makers in the form needed and in time to assist in decision making and planning.

An importance for the collection of programmatic information is that the data can be used in planning and decision making at the local, state, and federal levels (Geigle, 1978). Accurate, reliable and timely data and information provided through MIS can increase the effectiveness of decision making and enhance the planning process in cooperative education .

Managing Co-op Activity

The co-op experience develops from and depends upon clear, accurate, and frequent communication among employers, teachers, and students. Co-op coordinators need comprehensive information about students and a clear description of individual employer positions to place qualified students with various employers in positions appropriate to students' abilities and aspiration. Once students are placed, co-op coordinators are responsible for determining learning objectives for students; monitoring the progress of students during their work experiences; evaluating whether the learning has occurred; and making detailed progress reports. All these tasks require an effective and efficient information management (Varty, 1983).

Overall Evaluation

Information is also needed for program evaluation. Tyler (1980) stated that cooperative education requires both internal and external evaluation at various points in overall program activity. Initial program objectives and activity plans need to be assessed. Actual program activity needs to be reviewed to monitor whether and to what extent the planned program is being implemented. Planned outcomes must be established, and both planned and unplanned outcomes need to be evaluated. The complex nature of this particular learning strategy multiplies and further complicates the amount of information necessary to provide effective evaluation (Varty and Thompson, 1980).

Steps in Developing MIS

Several steps are involved in the process of developing a MIS for cooperative education:

1. Determining Program Goals and Objectives

The first step in planning a MIS is for the co-op coordinator to state clearly and precisely their program goals and objectives. Very often co-op coordinators do not take the time to carefully consider and articulate clearly program goals and objectives. Or, they failed to reviewed or revised program goals and objectives in relation to current experience periodically. Clear program objectives and a good understanding of what others expect are the necessary basis for information system development (Varty, 1983).

Objectives should clearly state what the co-op coordinators hope to accomplish or what they hope the students will accomplish as a result of their cooperative experiences. Information, in turn, helps to implement the objectives and, more importantly, tells whether the objectives have been accomplished. Any data that is collected should provide information that is necessary to meet objectives and to measure objective accomplishment. If the objectives are unclear, a workable system cannot be developed.

2. Identifying Information and Data Needs

Information requirements depend on the purpose for which the information is needed. Information may be used for generating reports, monitoring performance, forecasting, planning, and decision-making (Carter and Silverman, 1980). Different users may need different information. A better understanding of the information needs should help develop information system. Unless information needs are fully understood, the system will be unresponsive to their needs.

It is important here to distinguish between information and data. Data are statements, facts, or figures that may be accurate but in original context have little meaning or relevancy. Information is an aggregate of facts so organized, or a datum so utilized as to be knowledge or intelligence. Information is meaningful

data, whereas data as such have no intrinsic meaning or significance (Rosove, 1967). Two processes help convert data to information: separating the useful from the useless and the redundant from the pertinent, and drawing inferences or general propositions which are supported by data (Riley, 1980). As a general rule, data for collection should be carefully selected to maximize the information that does become available.

Rosove (1967) states:

> An information system is developed by translating a user's goals and objectives into a design for facilities, computers, computer programs, personnel, communications, and equipment. The goals and objectives must be transformed into a set of operational requirements before design work can begin (p. 67).

After specific goals and objectives have been established, the co-op coordinator becomes relatively easy to determine what information employers, school administrators, and students might need to know to meet or measure stated objectives. In essence, the following questions should be asked:

-- What information is needed to accomplish the objective?

-- What information is needed to determine if the objective has been attained?

-- What kinds of decisions will be made on the basis of the information?

-- What are the possible sources of the information needed?

Once data needs have been determined to meet or measure the accomplishment of program objectives, it is necessary to take an interim step focusing on current data collection instruments. This review is a first step in the process of refining collection instruments and, at the same time, a way of checking on the completeness of developed program objectives and consequent data needs. A comprehensive approach of reviewing data collection instruments provides an overview that is essential to the instrument refinement. The repetitive collection of the same data pieces will be reduced (Varty and Thompson, 1980).

The process of reviewing objectives and determining information and subsequent data needs is never complete since both program objectives and information requests change from year to year. Nevertheless, it is necessary at times to stop and identify the precise data that will be collected for a given period of time. Once such decision are made, collection instruments can be reviewed and the process continued.

As an outcome of step 1 and 2, there should be a comprehensive statement of requirements which tells what the MIS is supposed to do, in both qualitative and quantitative terms, but not how it is to do it.

3. Building the Data Base

An ideal MIS should be designed in the most cost-effective and efficient manner and providing users with the data or information they need. In other word, developing a data base is to integrate records and files after the data has been collected. A data base may contain several data files. Some of the most important factors for organizing data files are ease of use, ease of maintenance, speed of access, security, reliability, and cost (Carter and Silverman, 1980).

It should be pointed out that the data base should always keep up to date so that the data base has appropriate content which can provide accurate, meaningful, and timely output information to users. Usually, a computer is recommended for building a data base.

The comprehensiveness and utility of information depend on having an appropriate library of data available when co-op coordinators need it. In general, there are two components of building a data base:

a. Determining Data Collection and Procedures

The development of systematic and efficient information collection formats and procedures is as critical as a thorough information needs analysis. Well

designed forms for the collection of data, a carefully developed procedure with timeliness for the actual collection, and a specification of who will provide and who will validate data are essential for accurate and timely program information.

In general, data should be collected on well conceived and carefully designed forms. Collection instruments should be simple, clearly presented, and easily completed. The collection system as a whole must be flexible so as to easily incorporate additional data as new information needs are determined. Field testing is important before final collection formats are adopted. Whenever possible, data should only be collected once from the most accurate source. Requesting a piece of data on several instruments often results in annoyance, an increase in missing data, and always increases storage problems (Varty and Thompson, 1980).

Procedures are essential for a well-organized data collection effort. A carefully devised procedure should identify where and how data will be provided and validated, where and how long it will be stored, how and when it will be manipulated, and to whom and in what format it will be reported. In addition, it is important to keep in mind that the methods used to store and process data will influence the design of the collection instruments. For example, forms that are designed ready for computer scanning will simplify later data entry.

b. Determining the Methods of Storage and Manipulation of Information

As information needs are being assessed, data needed to supply that information are being identified, and collection processes and procedures are being determined. It is essential to establish how these data will be stored and manipulated to provide requested information. The methodology for storage and manipulation can place restrictions on what is collected, how it is collected, and how it can be used. In general, the selection of storage and processing techniques

will depend upon the purposes of the system, the amount and the complexity of the data to be collected and the way information needs to be reported (Varty, 1983).

As a group, co-op coordinators are probably least familiar with various means of data storage and manipulation. As coordinators enter the arena of mainframe, mini- and micro-computers, on-line and batch systems, there is a need for expert support. The staff of computing services and instructors of computer science at schools can be particularly helpful in providing technical assistance. Varty and Thompson (1980) offered the following suggestions that would help in determining how information will be stored and manipulated:

a. Identify available resources.
b. Use a simple system.
c. Become familiar with factors involved in selection of storage and manipulation resources.
d. Develop a manual storage and manipulation system even if computer services are available.
e. Develop well defined procedures.
f. Estimate future storage needs.
g. Relate manipulation reporting needs (pp. 10-11).

4. Reporting and Utilizing Information

If a co-op program is to receive significant support, its outcomes must be well presented to key individuals and administrative decision makers. After data are collected, stored, and manipulated co-op coordinators need to report clearly information about their program activity to the appropriate people. They also must utilize the information available to establish direction for future planning and development.

The manipulation of data is influenced by the desired final information output. Whenever possible, automated output should be designed for immediate reporting use. All information must be clearly and succinctly presented in a standardized format on a regular schedule. Regular recipients of reports should be identified and, when appropriate and possible, reports should be tailored to individuals.

Information reporting should be reviewed regularly to be sure that what is reported reflects an accurate picture of current program activity to the appropriate people (Varty and Thompson, 1980).

In summary, the quality of information produced in the co-op program and the extent to which it is effectively used to support program evaluation, planning, decision making, and day-to-day events is strongly influenced by the MIS structure and operating procedures. When designing the MIS, each of the four steps discussed in this section should be addressed. A successful system requires smooth operation of all four elements. If one is inappropriately designed or functioning improperly, it is sufficient to jeopardize the effectiveness of the entire system. In addition, an MIS requires ongoing maintenance if it is to be kept at maximum performance. Constant checks must be made to be sure that the channels of communication are kept open and that procedures continue to be relevant to the information needs of the users.

The Role of Computers in MIS

Although computers are not assumed necessary for operating management information system, they provide a number of significant advantages with respect to operating efficiencies, quicker access of needed information, and shared information between applications. The increased sophistication and friendliness of computers presents some interesting possibilities and opportunities for co-op coordinators to develop effective management and information processing system. However, it should keep in mind that computers are only a tool and their contribution to information management will be only as effective as the information system they implemented.

Management information systems were hardly hand-operated in the 1970s. They are, by and large, computer-based systems with a wide range of capability to

meet the needs of users. Beyond the simple business of "number-crunching," the computer can produce demographic, statistical, and fiscal data in whatever form the programmer requests it. Profiles, graphs, charts, statistical analyses, and student data all can be available by designing an effective plan. Co-op coordinators must be aware of these technological capabilities, and determine what resources are available to them.

The role of the computer is to store, process, and retrieve the information needed for management decision making. Only when it functions as a part of a well-planned system that serves the objectives for which it was designed will it be useful and effective. The computer can process and output enormous quantities of data in a myriad of forms at lightening speeds. One advantage of the use of a computer in MIS is that data from many levels of school organization and many programs can be fed from separate files into a central system and then disseminated to the people who need it much more quickly than it can be done by hand.

Recently, microcomputers become more powerful and more affordable. Microcomputer software companies have developed a great number of well designed software for file development, word processing, and career orientation materials. Microcomputers can be used as terminals for access via modems to both institutional and external information sources expanding the availability of stored information beyond the microcomputer itself. In addition, it is possible to connect a series of microcomputers together to network. This provides the opportunity for a centralized information system in a program that is physically decentralized. With the increases in computing speed, memory and information storage capacities, and reliability on microcomputers, it appears that microcomputers can be a solution to the information management of many co-op programs.

Today, there are numerous commercially available MIS's give the user capabilities in a single, integrated package; to retrieve selected data from the files, to aggregate and/or display in a variety of formats. There are, however, a number of "off-the-shelf" program packages that were not originally developed to be an MIS which will serve very well as the basis for a locally developed MIS. Among others, there are The Placement Assistant, Easytrieve, Report Generator, Statistical Analysis Systems (SAS), DBase, Reflex, Minitab, and Statistical Package for the Social Sciences (SPSS). These products and others can be employed by users as very powerful tools to retrieve and to aggregate data. These products do not require a great deal of training to use once the system is learned (Yost, 1985).

In the selection of any software and hardware for system implementation, Varty (1983) offered several points to be considered: (1) The selection of both software and hardware should be determined by the program information needs. The selection of a computer will be influenced primarily by the availability of appropriate software needed to store, manipulate, and report information. Systems can be computer driven but cannot be driven by the configuration and capacity of a particular computer and its available software. (2) The computer system that is selected should provide for management, information processing, and educational applications since all are critical to program operation. (3) Ideally, whatever computer component is chosen should be capable of integration with school's mainframe since much of the information necessary for cooperative program is already available in the student data base. (4) The system chosen should be simple, user friendly, efficient and capable of being maintained.

Conclusion

Cooperative education presents many unique and rather complicated information management needs in relation to other educational strategies.

Cooperative education needs a system that effectively and efficiently collects, processes, and reports program information. With the assistance of MIS, cooperative education programs planning and decision-making can be improved. Also, the needs of cooperative education can be handled more easily.

This paper has established a perspective for the utilization of the MIS concept in co-op program. Design of a management information system requires a thorough understanding of the nature of the types of information needed and the applications for which the information can be used. This paper has developed a conceptual framework that can assist co-op coordinators in utilization of the MIS concept to effectively collect, process, and report program information, and to utilize this information in carrying out their responsibilities.

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